# Planning for the Bay of the Future: Resources for Coastal Climate Change Adaptation

May 23, 2012 Berkeley, CA

## Workshop Summary

Prepared for

"Our Coast – Our Future: Planning for Sea Level Rise and Storm Hazards in the San Francisco Bay Area"

## Acknowledgements

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Julian Wood, PRBO Conservation Science

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Laurel Prevetti, City of San Jose
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## Table of Contents

## Executive Summary

On May 23, 2012, a workshop titled *Planning for the Bay of the Future: Resources for Coastal Climate Change Adaptation* was held in Berkeley, California. The goal of the workshop was to foster information exchange among workshop organizers and local planners, natural resource managers and flood protection managers about tools currently available and those still needed to support the integration of sea level rise adaptation into ongoing planning and management efforts. The workshop organizations and sponsors are each working on cutting-edge climate change adaptation initiatives: NOAA Coastal Services Center's Sea Level Rise Viewer; NOAA and the Bay Conservation and Development Commission's Adapting to Rising Tides project; and the Our Coast – Our Future decision-support tool in development by Gulf of the Farallones National Marine Sanctuary, USGS, PRBO Conservation Science, and the San Francisco Bay National Estuarine Research Reserve.

Eighty-eight coastal managers and planners with jurisdiction and legal authority along the San Francisco Bay shoreline and coast who use sea level rise and storm data and information in decision-making participated in the workshop.

### Current Local Adaptation Planning Efforts

Nearly all of the workshop attendees had direct experience with climate change adaptation planning and were familiar with the complexities of these projects. The types of adaptation work that attendees were involved in include: marsh restoration planning; evaluation of economic impacts to shoreline areas; local and regional transportation planning; city General Plan amendments; regional vulnerability assessments; land management practices; species management plans; sediment management; permitting; and flood preparedness planning.

During the registration process, participants were asked to describe specific areas of adaptation planning that they need help with. Respondents' top three need categories were: more locally relevant science and information; help with conducting vulnerability analyses; and assistance with identifying appropriate response actions for a given project.

66% of workshop registrants either do not currently use online decision support tools to assist their planning, or they were unfamiliar with the terminology. Registrants' most frequently-cited reason for not using decision support tools was that they were unaware of any which would meet their specific needs.

### OCOF Project Feedback

One of the objectives of the workshop was to introduce OCOF to San Francisco Bay stakeholders and to gather early feedback for project development. Some of the key takeaways for the OCOF project team were:

- Many of the observations and needs expressed by participants validate the OCOF approach. Participants noted that they need site-level, localized sea level rise predictions and accurate visualizations in order to make the kinds of decisions called for in their work.
- The most frequently-cited desired output of the OCOF tool was downloadable shapefiles, which is consistent with the expectation of participants that the tool will mainly be used by individuals with at least a working knowledge of GIS.
- Some of the benefits of OCOF named by participants include: increased buy-in from stakeholders; sounder science to underlie decisions; the ability to bring assessments "in house" instead of needing outside contractors; more rapid assessments; and cost savings.
- Input gathered during small group sessions included the need for more data layers pertaining to the built environment and infrastructure; interest in mobile access to data; desire for a "social" or community sharing aspect of the decision-support tool interface; the need for fine-scale shoreline characterization; clarifications about water levels and date ranges for scenarios; and interest in the model's hydrodynamic assumptions such as freshwater inputs.
- Next steps for the OCOF team include synthesizing feedback from several sources; conducting a stakeholder analysis; convening an advisory committee to work with the OCOF team throughout the life of the project; and investigating the feasibility of including several additional assumptions and scenarios in the model.

## Introduction

On May 23, 2012, a workshop titled *Planning for the Bay of the Future: Resources for Coastal Climate Change Adaptation* was held in Berkeley, California. This workshop was a collaboration among NOAA's Coastal Services Center; the Bay Conservation and Development Commission; the EBM Tools Network; USGS, PRBO Conservation Science; the San Francisco Bay National Estuarine Research Reserve; and the Gulf of the Farallones National Marine Sanctuary.

Workshop organizers wanted to use this opportunity to communicate about several important projects that could support local efforts to address potential climate change impacts from sea level rise and storm hazards:

- NOAA Coastal Services Center's Sea Level Rise and Coastal Flooding Impacts Viewer: a screening-level sea level rise visualization tool that will be available for the San Francisco Bay Area and coastal California in Summer 2012.
- NOAA and Bay Conservation and Development Commission's Adapting to Rising Tides project: a method for conducting vulnerability assessments scaled to community and regional levels.
- Our Coast–Our Future: the state-of-the-science decision support tool to inform local sea level rise adaptation planning for the 9-county Bay Area shoreline and outer coast.

Rebecca Lunde demonstrates NOAA's SLR Viewer

Eighty-eight coastal managers and planners with jurisdiction and legal authority along the San Francisco Bay shoreline and coast who use sea level rise and storm data and information in decision-making participated in the workshop.

## Workshop Goal

Foster a dialogue among workshop organizers and local planners, resource managers and flood protection managers about the tools and products currently available and those still needed to support the integration of sea level rise adaptation into ongoing planning efforts.

Sam Veloz explains OCOF's decision support tool

## Workshop Objectives

1. Set the stage to discuss tools and resources needed to support adaptation planning by presenting initiatives to integrate sea level rise adaptation into ongoing habitat restoration, flood management, and city planning efforts.
2. Communicate with stakeholders about the synergies and differences between various existing sea level rise planning assistance tools and approaches.
3. Kick off the OCOF collaborative tool development process for the San Francisco Bay by fostering productive information exchange between OCOF staff and end users.
4. Provide participants with opportunities to network, share experiences, and learn from each other.

## Workshop Structure

The workshop was held at the David Brower Center in downtown Berkeley. The morning included adaptation planning case studies presented by the professionals involved in the projects. Afternoon interactive sessions were designed to introduce the OCOF project to San Francisco Bay shoreline stakeholders, and to gather important early feedback into the project.

## Results from Registration Survey

Participants were requested to pre-register for the workshop. 88 individuals completed registration, nearly all of them attended, and there were a few additional attendees who did not pre-register. City and county employees together made up one-third of registrants. A large number of contractors (many of whom develop adaptation plans for local governments), and state and federal employees were also in attendance.

| Type of Organization | |
|---|---|
| County | 23% |
| State | 19% |
| Federal | 15% |
| Consultant | 15% |
| City | 10% |
| Non-profit | 10% |
| University | 6% |
| Private | 2% |

As a part of the registration process, participants were asked 4 questions related to their experiences with climate change adaptation planning.

***1. Please tell us briefly what type of climate change adaptation work you do in your job.***

The purpose of this question was to provide workshop organizers with a general sense of the participants' levels of knowledge, comfort, and experience with climate change adaptation planning, in order to structure the day most effectively:

Answers spanned a wide spectrum of activities including marsh restoration planning; evaluation of economic impacts to shoreline areas; local and regional transportation planning; city General Plan amendments; regional vulnerability assessments; land management practices; species management plans; sediment management; permitting; and flood preparedness planning. Nearly all of the attendees had direct experience with climate change adaptation planning and were familiar with the complexities.

***2. Are there other climate change-related programs, plans, or policies that your organization is working on?***

This question was asked to capture any adaptation projects underway at a participants' organization, on which the participant wasn't working. Because climate change adaptation planning is a new field, this type of work is currently conducted by a wide array of individuals working in disparate functions in their respective organizations. The majority of respondents' organizations have multiple climate change adaption planning efforts, and answers provided would indicate that there is some movement towards mainstreaming climate change adaptation into existing planning processes.

***3. With regards to your sea level rise and storm hazards planning, what are the areas in which you need the most help?***

Registrants told us in their own words what they needed help with, and those answers were then coded into categories based upon the resources required to meet the need. The top 3 need categories were: more locally relevant science and information; help with conducting vulnerability analyses; and assistance with identifying appropriate response actions.

| Areas in which respondents need most help | |
|---|---|
| Better science and information | 19% |
| Identifying / selecting response actions | 18% |
| Conducting vulnerability analyses | 18% |
| Understanding / selecting analysis tools | 13% |
| Partnerships for action | 10% |
| Communicating climate change | 8% |
| Policies to support and clarify actions | 7% |
| Prioritizing restoration options | 7% |

***4. Do you currently use online decision support tools? If so, which do you like and why? If not, why not, what are the obstacles?***

66% of those who responded to this question do not use decision support tools. The most frequent reason cited was they are not aware of any tools that would meet their needs. In addition, several of the respondents were not familiar with the term "online decision support tool". Responses from those who did say that they use online decision support tools indicate that their understanding of the term differs from that of the survey developers – a number of individuals listed "maps" as the online decision support tool that they use, but maps do not necessarily provide the context and interactivity of what we consider to be a decision support tool.

## Presentations

The morning plenary consisted of several presentations meant to provide participants with examples of local climate change adaptation planning, and opportunities for peer-to-peer learning about projects already underway that included:

Andrew Gunther, Bay Area Ecosystems Climate Change Consortium, provided a welcome and introduction to the day.

Norma Camacho, Santa Clara Valley Water District, described how the South Bay Salt Ponds Restoration Project conducted a flood risk analysis under different sea level rise scenarios.

Laurel Prevetti, City of San Jose, presented San Jose's sea level rise adaptation policies that were incorporated into the city's recent General Plan update.

Wendy Goodfriend, Bay Conservation and Development Commission, explained the Adapting to Rising Tides project's sea level rise vulnerability analysis process for Alameda County.

John Rozum, NOAA Coastal Services Center and EBM Tools Network, provided an introduction to the role that data and tools play in adaptation planning, and an overview of tools developed or localized for use in the Bay Area.


Wendy Goodfriend presents the ART project

## Input Sessions

The afternoon sessions were designed to foster dialogue between OCOF staff and intended users of the OCOF tool. The main objectives were to describe the expansion of the OCOF project into the Bay; to solicit early feedback on tool development and its potential uses; and to identify key stakeholders interested in partnering with the OCOF team.

Kelley Higgasson, Gulf of the Farallones National Marine Sanctuary, and Marina Psaros, Coravai LLC, gave an introduction to the OCOF project and an orientation to the afternoon's 3 input sessions through which all participants would rotate.

Julian Wood leads a small group input session

### Ask The Experts: How Will OCOF Work?

Sam Veloz and Patrick Barnard introduced key scientific and technical concepts about the OCOF projects to small groups, and solicited feedback on a FAQ and on model inputs and tool development.

### Small Groups: How Can OCOF Support My Work?

Kelley Higgason and Julian Wood facilitated small groups through a series of questions to describe when and how OCOF could be used in real-world local projects, and the functionality needed to do so.

### On Your Own: Explore OCOF, ART, and Viewer

Marina Psaros spoke with potential users about the OCOF project and synergies with other climate change adaptation planning initiatives in the Bay Area. At this input station, participants were also invited to explore NOAA's Sea Level Rise and Coastal Impacts Viewer and the Adapting to Rise Tides project on their own.

## Synthesis of OCOF Feedback

The OCOF team gathered a large amount of valuable information throughout the life of the workshop, from early planning discussions with other workshop organizers which helped to clarify the differences and synergies between organizers' initiatives; to using the results of the registration survey as an aid in workshop activity planning; to the interactions throughout the workshop between the OCOF team and our intended users that will inform our early project planning and development. This section synthesizes and summarizes the feedback that the OCOF team has gathered and will use in the next steps of the project.

### Small Groups: How Can OCOF Support My Work?

In this session, facilitators led groups of 6-8 people through a series of questions designed to help the OCOF team understand the needs of potential end users, and to help those users better understand the project. Facilitators asked participants to think of a specific climate change adaptation project that they were working on, and then the group used the question series to explore how the OCOF tool might support the project.

A total of 18 different ideas were discussed, including: several permitting and environmental analysis processes (CEQA, NEPA, etc); municipal and transportation plans; habitat restoration projects; levee maintenance; and species protection plans.

Specific examples of projects discussed include:

- General Plan update for the city of Hayward
- South Bay Salt Ponds restoration planning
- Baylands Goals Climate Change Update
- San Francisco International Airport Master Plan Update
- San Francisco Bay Joint Venture Implementation Plan update

Many of the observations and needs expressed by participants in these groups validate the OCOF approach. Participants noted that they need site-level, localized sea level rise predictions and accurate visualizations in order to make the decisions called for in their work. The most frequently-cited desired output of the OCOF tool was downloadable shapefiles, which is consistent with the expectation of participants that the tool will mainly be used by individuals with at least a working knowledge of GIS.

Some of the benefits of OCOF named by participants include:

- Increased buy-in from stakeholders
- Sounder science to underlie decisions
- The ability to bring assessments "in house" instead of needing outside contractors
- More rapid assessments
- Cost savings

### Ask the Experts: How Will OCOF Work?

In this session, OCOF developers spoke with small groups about the technical aspects of the project – Patrick Barnard described the model inputs and scenarios, and Sam Veloz described the online decision support tool. The purpose of this session was to allow participants to ask questions, and raise suggestions and concerns that they might not raise in a larger group or a formal presentation setting.

Reflecting the professional affiliations of the attendees, there was higher interest than the OCOF team had originally anticipated in land use planning and infrastructure considerations. Question themes for Sam Veloz included the need for more data layers pertaining to infrastructure; what to provide in terms of a "social" or community sharing aspect of the decision-support tool interface; and fine-scale shoreline characterization. Question themes for Patrick Barnard centered around the model's hydrodynamic assumptions such as freshwater inputs from the Delta; water level and date ranges for scenarios; storm surges; stormwater flooding; and vertical land movement.

### Registration Survey and Workshop Feedback

Several registrants noted on the survey and at the workshop that they didn't know what an "online decision support tool" was, and others used the term differently from the way the OCOF team uses it. This indicates that the term may not be the most useful or accessible with certain audiences, and OCOF staff should consider this in future communications.

Respondents' answers to the registration survey question "With regards to your sea level rise and storm hazards planning, what are the areas in which you need the most help?" validate the OCOF project

model. The top 3 responses to that question were: more local science and information; help with conducting vulnerability analyses, and identifying appropriate response actions. These answers indicate that the technical assistance component of the project will be a key to the success of OCOF.

Several participants wanted to understand whether and how OCOF products would integrate with other PRBO initiatives, particularly the existing PRBO Sea Level Rise Viewer which is focused on species impacts related to tidal wetland habitats. Possibilities for integration will continue to be discussed amongst the OCOF team and with end users so that the user community is best served.

At the workshop, the team also learned that there is a unique set of users interested in the built environment. OCOF tools will need to be tailored to the types of questions that these users ask of it, particularly related to buildings, communities, water treatment facilities, roads, and other infrastructure (for example, "how long will a given sea wall be expected to provide protection for the community?"). At the same time, there is a large number of users who are focused on natural resource vulnerabilities (for example, "how will a given marsh respond to sea level rise?"). The OCOF team will need to develop tools that meet the needs of both of these types of users.

## Next Steps

Utilizing the input gathered through the workshop, the priority next steps of the project include:

- Conduct a stakeholder analysis of potential end users.
- Convene an advisory committee consisting of partners identified through the OCOF grant writing process, and additional members identified during the workshop.
- Synthesize decision-support tool feedback gathered during this workshop and other focus groups and input sessions. Develop work plan to address feedback.
- Create an FAQ based on the recurring question themes raised in the workshop.
- Complete a Needs Assessment document to guide early product development cycle.
- Investigate the feasibility of addressing questions related to flooding frequency and groundwater intrusion in the model.

# Planning for the Bay of the Future: Resources for Coastal Climate Change Adaptation

**David Brower Center, 2150 Allston Way, Berkeley, CA**
**May 23, 2012**

## AGENDA

**8:30 Check-in and Refreshments**

### Welcome

**9:00 Sea Level Rise and the Bay of the Future**
Andrew Gunther, Executive Coordinator, Bay Area Ecosystems Climate Change Consortium

### Local Examples – What's Already Being Done?

**9:20 Integrating Sea Level Rise Considerations in the South Bay Salt Ponds Restoration Project**
Norma Camacho, Chief Operating Officer–Watersheds, Santa Clara Valley Water District

**9:55 Incorporation of Sea Level Rise Policies in the City of San Jose's General Plan**
Laurel Prevetti, Assistant Director–Planning, City of San Jose

**10:30 Break**

### Methods and Tools – How Can YOU Get it Done?

**10:45 The Adapting to Rising Tides (ART) Project: Collaborative Adaptation Planning in Alameda County**
Wendy Goodfriend, Senior Planner, San Francisco Bay Conservation and Development Commission

**11: 20 SF Bay Sea Level Rise Adaptation Planning: How Tools Can Help You**
John Rozum, Training Coordinator, EBM Tools Network

**12:00 Lunch**

### The Our Coast Our Future Project – Help Shape the New Tool

**12:45 Our Coast Our Future Project Overview**
Marina Psaros, OCOF Collaboration Lead, Coravai LLC; Kelley Higgason, OCOF Project Coordinator, Gulf of the Farallones National Marine Sanctuary

**1:15 Input Sessions for Sea Level Rise Tool Development**

### Wrap-Up Discussion

**3:30 Closing Thoughts and Next Steps**
Led by Andrew Gunther, Executive Coordinator, Bay Area Ecosystems Climate Change Consortium

**4:00 Adjourn**

## Organizing Committee

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NOAA Office of Ocean and Coastal Resource Management

US Fish & Wildlife Service, Coastal Impact Assistance Program

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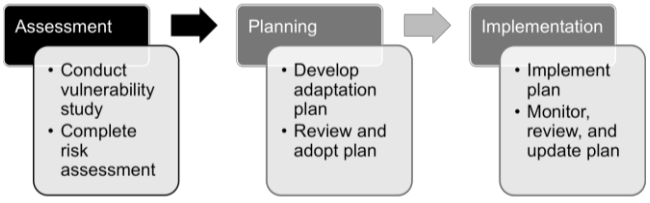
## Appendix iii: The OCOF Project

With changing climatic conditions, both the natural habitats and the built infrastructure of the outer coast and bay shoreline in the San Francisco Bay Area face negative impacts from sea level rise, erosion, salinity changes, and precipitation variability. Planning for the impacts of climate change on coastal ecosystems and communities may be the greatest challenge facing local decision-makers today. While there is a general awareness of the problem, easy access to data and information is often lacking and solutions remain elusive.

Through the collaborative project, "Our Coast–Our Future: Planning for Sea level Rise and Storm Hazards in the San Francisco Bay Area" (OCOF) Gulf of the Farallones National Marine Sanctuary, PRBO Conservation Science, U.S. Geological Survey, National Park Service, and the San Francisco Bay National Estuarine Research Reserve have teamed up to help address the affects of sea level rise and storm hazards in the 9-county San Francisco Bay Area.

The ultimate goal of the project is to provide natural resource managers, local governments, coastal planners, and others with science-based, decision support tools to plan for and respond to sea level rise and storm hazards along the region's coast and shoreline areas.

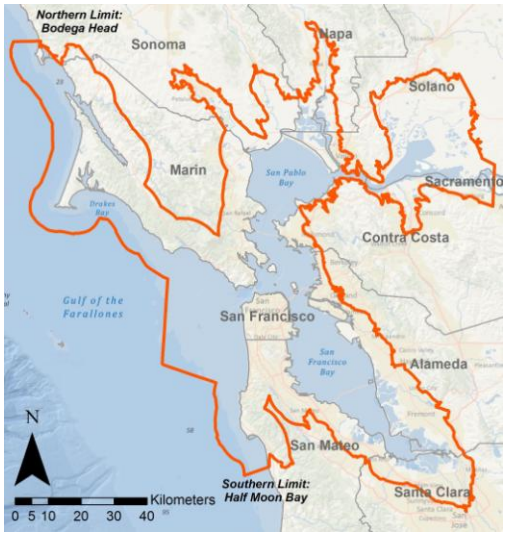
OCOF decision support tools will be useful during the assessment phase of a climate change adaptation planning process:




Adaptation Planning Process, Adapted from Griggs 2012

### Project Objectives and Outcomes

- Model vulnerabilities from sea level rise and storm hazards, including factors such as water levels, wave heights, flooding, and erosion.
- Obtain insight and feedback on stakeholder information needs through an advisory committee and a variety of outreach activities.
- Map infrastructure and ecosystem vulnerabilities to sea level rise and storm hazards at the scale needed for management action.
- Develop an online, user-driven decision support tool with interactive maps to apply to adaptation, restoration, and management strategies.
- Provide training and in-depth technical assistance on the use of the decision support tool.




OCOF Project Study Area

### The Adaptive Planning Toolbox

Through the above activities, OCOF will develop a variety of information and tools that are needed to plan for a changing coastline, including:

- Seamless Digital Elevation Model (DEM) at 2 meter horizontal resolution from Half Moon Bay to Bodega Head and along the Bay shoreline.
- Suite of sea level rise and storm scenarios using the Coastal Storm Modeling System (CoSMoS) developed by USGS.
- Interactive maps overlaying built and natural vulnerabilities on the scenario suite.
- Online decision support tool tailored to stakeholder information needs.
- Report presenting the project findings and summarizing impacts to our built and natural coastal environment based on these findings.